NASA News

National Aeronautics and
Space Administration

Washington, D.C. 20546
AC 202 755-8370

P82-10199

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For Release
IMMEDIATE

RELEASE NO: 82-194

HIGHLIGHTS OF 1982 ACTIVITIES

This was the year the Space Shuttle, the reusable Space Transportation System, became operational as the National Aeronautics and Space Administration scored another perfect launch record in 1982.

The STS-3 and STS-4 missions in March and June wound up the series of four development flights to complete the shakedown of the Shuttle orbiter and booster systems.

The successful STS-5 flight in November, in which two commercial communications satellites were launched into orbit, marked the first operational use of the Shuttle.

The Shuttle impacts virtually all of the program areas of NASA, mainly through experiments flown on each of the missions.

Superior pictures of earth are being transmitted from new instruments aboard Landsat 4, the latest generation of earth remote sensing satellites launched in July.

In addition to the three Shuttle missions, there were 11 successful launches, mainly commercial and international communications satellites, by the agency. This is the sixth perfect launch record in the agency's 24-year history.

December 23, 1982

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OFFICE OF SPACE FLIGHT

Three successful Space Shuttle flights, including the first commercial mission, highlighted the year for NASA's Office of Space Flight. STS-5 deployed two commercial communication satellites during its flight. STS-4 completed the four-mission Orbital Flight Test (OFT) series with a near flawless mission and STS-3 successfully used the Remote Manipulator System.

In addition, a successful Flight Readiness Firing with orbiter Challenger was conducted Dec. 18 at Kennedy Space Center. Challenger is scheduled to fly its first mission in late January 1983.

Despite the cancellation of an extra vehicular activity on STS-5, launched on Nov. 11, the mission was considered a resounding success as the crew deployed Satellite Business System's SBS-3 and Telesat Canada's Anik C-3 into low earth parking orbit over the Pacific Ocean. After deployment from the orbiter Columbia's payload bay each spacecraft was successfully placed into a transfer orbit and eventually into geosynchrous orbit.

Astronauts Willam Lenoir and Joseph Allen were scheduled to conduct a 3-1/2 hour space walk in the Columbia's payload bay and perform a variety of work tasks. The failure of components in both space suits prompted mission controllers to scrub the spacewalk.

Commander Vance Brand and pilot Robert Overmyer successfully operated the Columbia during the precise maneuvers required to deploy the two satellites and brought the orbiter down through a cloudy sky to a pin-point landing at Edwards Air Force Base, Calif., on Nov. 16.

STS-4 concluded at Edwards Air Force Base on July 4 in front of an estimated half-million people including President Ronald Reagan and Mrs. Reagan. The nearly flawless mission, conducted by astronauts T.K. "Ken " Mattingly and Henry W. Hartsfield, Jr., ended the four-flight OFT program to qualify the Space Shuttle as operationally ready.

Launched on June 27 from the Kennedy Space Center, Fla., Columbia's crew carried out an engineering test of the Continuous Flow Electrophoresis System. This was the first commercial experiment to be carried out aboard the Space Shuttle under a joint endeavor agreement between NASA and McDonnell Douglas Astronautics Co.

The first "Getaway Special" experiment was devised by a group of students from Utah State University. The unique canister of nine experiments was carried in the payload bay of the Columbia. A Monodisperse Latex Reactor experiment was also conducted as were the first Shuttle Student Involvement experiments.

STS-3, launched on March 22, was the longest Shuttle mission to date. Columbia was diverted to a landing at White Sands Missile Range, N.M., when Rogers Dry Lake at Edwards Air Force Base was turned into a quagmire by heavy rains in late January and early February. A decision was made to land at Northrup Strip, a hard packed gypsum surface, on the missile range. Then on the designated landing day a vicious wind whipped up clouds of dust thousands of feet high and forced the Columbia to delay the landing by one day. On March 30 flight commander Jack Lousma and pilot C. Gordon Fullerton successfully brought the Columbia down to a safe landing on the desert runway.

The Remote Manipulator System (RMS) or arm was successfully operated by the crew. The system provided a unique capability when a television camera on the remote arm's "elbow" transmitted pictures of several thermal protection system tiles missing from the Columbia's nose section.

On board was OSS-1, a pathfinder space science package, which provided exceptionally good data to experimenters, including a Plasma Diagnostics Package flown to detect the movement of magnetic and electrical fields generated by Columbia in flight. The arm moved the package around the area of the orbiter nose and payload bay to obtain the important scientific data.

A "Getaway Special" test canister was flown as was the first student experiment.

Several days before the landing of Columbia on July 4, the second Space Shuttle orbiter, Challenger, was moved from the Rockwell International assembly facility in Palmdale, Calif., to the NASA Dryden Flight Research Facility at Edwards. The Challenger was mounted atop its 747 carrier aircraft and was ferried to the Kennedy Space Center on July 4 just hours after the Columbia landed.

During the year crews were named for flights 7 through 10. Crewmembers for STS-7 are commander Robert Crippen and pilot Frederick Hauck. Mission specialists will be John Fabian, Sally Ride, the first American woman named to a flight crew, and Norman Thagard.

The STS-8 crew will be Richard Truly, commander, and Daniel Brandenstein, pilot, with mission specialists Dale Gardner, Guion Bluford Jr. and William Thornton. John Young will command the STS-9 Spacelab mission with Brewster Shaw Jr. as pilot. Mission Specialists will be Dr. Owen Garriott and Dr. Robert Parker. The European Space Agency named Ulf Merbold, of West Germany, as its payload specialist for Spacelab. The U.S. payload specialist is Byron Lichtenberg.

Thagard and Thornton, both physicians, were added to the STS-7 and 8 crews respectively to gather data on space sickness.

STS-10, a DOD dedicated mission, will be commanded by T.K. Mattingly with pilot Loren Shriver. Mission specialists will be Ellison Onizuka, James Buchli and an Air Force manned spaceflight engineer to be named later.

NASA revised its policy on payload specialists by expanding the opportunities available to customers who would fly a unique experiment aboard the Space Shuttle. Under the expanded program, to begin in 1984 when mission requirements and manifesting permit, flight opportunities will be made available on a reimbursable basis to all classes of major Shuttle customers. This will include commercial, foreign, cooperative and DOD users.

There were nine expendable launch vehicles used to place spacecraft into earth orbit in 1982. Seven Delta and two Atlas Centaur launches were successful.

A Space Station Task Force was established by NASA Administrator James Beggs. Coincidental during the year with the formation of the group was the awarding of eight Space Station mission study contracts to private industry. The studies are expected to identify and analyze scientific, commercial, national security and space operational missions that could be most efficiently conducted by a Space Station.

SPACE SCIENCE AND APPLICATIONS

Dr. Burton Edelson, senior vice president of Comsat General Corp., was named Associate Administrator for the newly merged Office of Space Science and Applications in February 1982.

The third Shuttle flight carried a series of solar and plasma physics experiments which enabled scientists and engineers to ascertain that the payload bay environment of the Shuttle was suitable for scientific studies. One of the experiments produced images which show glowing on the edges of the orbiter toward the direction of orbit flight. This has been attributed to the recombination of oxygen ions under the compression energy of the Shuttle's orbital flight through the ionosphere at 130 miles altitude.

The Pioneer 10 spacecraft had its 10th anniversary since launch, some 2.5 billion miles from Earth. This spacecraft and its twin, Pioneer 11, are now conducting extended solar wind studies in deep space. The two Pioneers may also be able, through gravitational navigation techniques, to determine if there is a "10th planet" or other object beyond the orbit of Pluto. There are known disturbances in the orbits of Neptune and Uranus which suggest another object.

The Solar Maximum Satellite, functioning with only one-third of its instruments due to a pointing control problem, detected a drop in the sun's ultraviolet energy output over a period of 18 months from February 1980 through August 1981. This drop in energy output could have implications for climate trends here on earth.

The last of more than 50,000 stored photographs transmitted by the two Viking landers and two Viking orbiters was processed at NASA's Jet Propulsion Laboratory, Pasadena, Calif. This set of Martian photos covers a period of time ranging from 1976 through 1981 and includes early morning cloud pictures, ground frost pictures and before, during and after pictures of a planet-wide sandstorm. The Viking 1 lander, the Tim Mutch Memorial Station, continues to record information about the surface conditions for transmission to earth once a week.

Researchers at the Ames Research Center, Mountain View, Calif., completed the preliminary analysis of the Pioneer Venus mission by hosting the first science conference on that planet. One of the striking findings was the strong suggestion, based on Pioneer Venus probe data, that Venus may have been covered by a global ocean early in its development. The tremendous heat of the planet has been determined to be the result of a runaway greenhouse effect trapping the sun's thermal energy. Lightning has been detected on the surface and is considered by researchers to be associated with possible active volcanic areas in two of the continent landforms of the planet.

Langley Research Center, Hampton, Va., and Ames collaborated on an effort to retrieve airborne samples and associated spacecraft remote sensing information to compile a record and history of the material ejected into the atmosphere by the eruption of El Chichon volcano in March. Results of that collaboration will contribute to further understanding of the effects of volcanoes on local and global weather changes.

Landsat 4, the latest generation earth remote sensing spacecraft, was launched in July and almost immediately began transmitting back superior pictures of earth. The new spacecraft instrument, the thematic mapper, has worked far beyond initial expectations and is currently producing images with 30 meter resolution of the Eastern United States. Landsat 4 will begin to use the Tracking and Data Relay Satellite, once it is launched, to return pictures of the entire planet at this new resolution.

Although NASA has no specific Halley Comet mission, it has organized and will play the key coordination role for an International Halley Watch. The watch will be an electronic data exchange network for the benefit of the scientists involved in the three spacecraft missions to Halley.

NASA's Goddard Space Flight Center, Greenbelt, Md., and Jet Propulsion Laboratory will be involved in the network and will produce a summary list of information learned about the Comet, scheduled for to appear during fall of 1985 and spring of 1986.

The International Sun Earth Explorer 3, a solar-terrestrial explorer primarily measuring the nature of the solar wind, was moved from its sunward orbit to a position in the wake of the solar wind behind the earth.

The ISEE 3 will remain there until mid 1985 measuring the interaction of the solar wind with the Earth's magnetic tail. In late 1985 the spacecraft will be moved again to encounter the comet Giacobini-Zinner in the winter of 1986. This encounter will provide valuable information for the other nation's spacecraft which will encounter Halley's Comet.

The space agency signed a cooperative agreement with the National Science Foundation to operate the NSF's National Scientific Balloon Facility, Palestine, Texas. NASA was the primary user of the facility, launching high altitude atmospheric and astrophysics payloads with helium-filled balloons.

The non-astronaut science crew for the NASA/ESA Spacelab 1 mission were selected. Ulf Merbold, a physicist from West Germany, and Byron Lichtenberg, a biologist from Massachusetts Institute of Technology, were selected by NASA and ESA to perform scientific duties aboard the Spacelab, scheduled for STS-9 in October 1983.

The cooperative satellite search and rescue program got off to a life-saving start in June when the emergency beacon transponder-equipped Soviet COSPAS satellite was launched. The COSPAS has already been credited with saving five lives in the first few months of the demonstration project. The NASA transponder will be launched aboard the NOAA-E spacecraft in February, 1983. The system works more effectively than routine aircraft or ship distress locator systems because of the global coverage provided by an orbiting satellite. The program also involves the Canadian and French governments.

Astronomers at JPL have detected frozen methane on Pluto and the Neptune moon Triton. This important discovery will result in some additional questions put to the Voyager science team as they prepare for the 1986 encounter of Voyager 2 with Uranus. Uranus and Neptune are now believed to be both frozen methane planets with very similar atmospheres. Uranus, however, revolves about an axis which is perpendicular to the axes of all the other planets.

Scientists at both NASA and in Australia used very long baseline interferometry techniques to study quasars -- Quasi Stellar Sources - and discovered the most distant object yet found in our universe.

The object, identified by its star catalog number, PKS 2000-330, is more than 12 billion light years from earth. The previous record holder was about 11 1/2 billion light years distant.

AERONAUTICAL RESEARCH

In 1982 NASA's research in aeronautics continued to provide advanced technology which will enable future U.S. aircraft to achieve greater energy efficiency or fuel economy, enhanced performance, greater safety and reduced operational costs.

Progress was made in technology for reducing jet engine fuel consumption, increasing high-speed propeller (propfan) efficiency, reducing aircraft drag and reducing aircraft structural weight.

Tests of advanced turbofan engine core components in the Energy Efficient Engine program confirmed that it is feasible for future engines using this technology to achieve fuel consumption rates as much as 15 percent lower than today's standard wide-body transport aircraft engines.

Important experimental data were obtained in the advanced turboprop program on propeller performance, noise reduction and installation effects. They indicate the potential for fuel savings from 15 to 20 percent of advanced subsonic transport aircraft using high-speed propellers (propfans) compared to aircraft using advanced turbofans in the Mach 0.7 - 0.8 regime.

Aircraft drag reduction research emphasized techniques for maintaining laminar boundary-layer airflow over aircraft wings and other surfaces.

An advanced concept supercritical airfoil for swept-wing platforms, designed with features to simplify laminarization was fabricated, and wind-tunnel evaluation of its performance began during the year. Flight test evaluation of two wing leading-edge concepts is scheduled for 1983.

Important progress occurred in the area of lightweight structural composites. A Lockheed L-1011 graphite-epoxy vertical fin, based on NASA technology, successfully met strength and damage resistance test requirements. Similarly, a composite horizontal stabilizer design for the Boeing 737 received Federal Aviation Administration airworthiness certification, a "first" for medium-primary composite structures for commercial aircraft. Concurrently, research proceeded in the development of advanced composite materials, exhibiting greater strain capability and damage resistance.

Research results were achieved in both fixed-wing and rotary-wing performance enhancement for both military and civil aircraft.

In 1982, the Highly Maneuverable Aircraft Technology (HIMAT) vehicle demonstrated and exceeded its supersonic performance design goal of operation at Mach 1.4 at 12,200 meters (40,000 feet) altitude for three minutes using full-engine afterburner. Technology objectives in this program could double the maneuverability at transonic speeds of U.S. fighter aircraft in the 1990s.

The joint Air Force/NASA Advanced Fighter Technology Integration (AFTI) effort, directed at future fighter applications, began its flight research program this year at NASA's Dryden Flight Research Facility, Edwards, Calif.

General Dynamics applied the NASA-developed "arrow-wing" configuration concept to two F-16XL aircraft which are now being flight tested at Edwards Air Force Base.

Wind-tunnel tests were performed at NASA's Ames and Langley Research Centers on DOD's X-29 Forward Swept Wing Flight Demonstrator configuration to obtrain low- and high-speed aerodynamic data and to investigate engine inlet performance. NASA technical support was also given in the areas of instrumentation, structural dynamics, handling qualities, and control systems. NASA will conduct the government flight tests later in the program.

The NASA-Army Tilt Rotor Research Aircraft continued proof-of-concept flights and extensive operational demonstration flights for the military services including Navy sea trials on the USS Tripoli. The tilt rotor concept combines the efficient and precise hover and vertical takeoff/landing characteristics of helicopters with the speed, range and endurance of current turboprop airplanes for both civil and military applications.

Progress continued in 1982 in defining atmospheric hazards and advancing fire and crash safety technology. A major advance was made in the characterization of atmospheric lightning by the accumulation of 147 direct lightning strikes on the F-106B research aircraft. NASA participated in the cooperative interagency Joint Airport Weather Study (JAWS) which collected vital data during more than 50 wind shear episodes in the Denver area. A flight research program was initiated to compare natural icing conditions and icing research data developed in the Icing Research Tunnel at the Lewis Research Center.

In cooperation with the FAA, NASA continued development of advanced lightweight materials to reduce the threat of fire in aircraft cabins. Specifically, new seat cushion foam concepts were developed and tested. A new NASA-FAA safety research program was initiated to demonstrate antimisting kerosene safety fuel and measure structural loads in a remotely controlled crash of a civil jet transport scheduled for 1984.

NASA, in cooperation with the FAA, has completed development of the Aviation Safety Reporting System -- a voluntary, confidential nonpunitive reporting system designed to surface deficiencies in the National Aviation System before accidents occur. The system has received more than 30,000 reports since April 19, 1976; issued 740 alert bulletins; and published 240 reports.

The ability to compute the aerodynamic forces and torques acting on aircraft in flight was substantially advanced during 1982. Using scientific computers, transonic air flows over wings, bodies and nacelles have been predicted with good accuracy, allowing for economical study of the best positioning of these basic aircraft components. For some specialized conditions, flow computations have become sufficiently accurate to shorten substantially wind-tunnel testing of aerodynamic components.

SPACE RESEARCH AND TECHNOLOGY

The NASA space research and technology program provides the advanced technology for enabling and improving the operational capability, reliability and affordability of existing and planned space systems for NASA, commercial and military applications.

During 1982, the Shuttle orbiter was used as an experimental facility for research efforts in aerodynamics, thermal protection systems and payload environment, with a capability to provide a range of test parameters far in excess of that obtainable in ground facilities or experimental aircraft. The knowledge gained will enable greater orbiter performance and play a significant role in designing payloads.

A new low-cost thermal protection system for the Space Shuttle orbiter thermal protection shield has been demonstrated in laboratory tests. The material, Advanced Flexible Reusable Surface Insulation, could be used in temperature ranges below 1,200 F. Its use on the orbiter lee side offers more damage tolerance, easier maintenance and lower installation cost.

Advanced analytical techniques to predict Shuttle payload dynamic response were developed, reducing the time required for such analysis from nine months to less than one month.

Conceptual designs of an advanced high-performance expander cycle engine for an advanced upper-stage vehicle have been developed leading to very high performance over a wide throttling range.

Combustor designs that permit very efficient heat transfer are considered the critical technologies.

Significant improvements in the power output of solar array power systems has been achieved.

A low cost solar array has been tested, which has the potential for reducing array costs to approximately $30 per watt.

Components were identified which could potentially revolutionize solar cell energy conversion, increasing efficiencies from the current 16 percent to as much as 50 percent. These concepts include coupling sunlight into the electronic surface charge density, cascading solar cell junctions for selective spectral utilization, and exploiting the unique properties of the photoactive protein, rhodopsin.

Intensive work has continued in high capacity energy storage, critical to long duration missions.

New components have been developed to meet the requirements of future higher voltage, higher power space systems. One is the development of a 25 kilowatt, lightweight, high frequency transformer.

A long-life Stirling cycle mechanical cooler was successfully developed and tested. The design is based on actively-controlled linear magnetic bearings and a pair of linear motors, thereby eliminating the problems associated with mechanical friction and lubricants in previous cooler designs.

The first 60 gigahertz low-noise receiver was developed for spacecraft systems data transfer. Development of a solid state, 30 gHz power amplifier was also completed for integration with the modulator/exciter into a 60 gHz transmitter. These capabilities will enable high transfer rates of large quantities of data in millimeter-wave intersatellite communication links.

NASA ENERGY PROGRAMS

NASA supports the Department of Energy (DOE) and other agencies in the development of energy technology.

Automotive Propulsion Research

The automotive Stirling engine research project has accumulated more than 1,300 hours of experimental engine testing. Results showed efficiencies equal to automotive diesel engines and emissions lower than Environmental Protection Agency research goals.

In the advanced automotive gas turbine engine program, cold spin tests of simulated and actual turbine rotors have demonstrated that the strength required in the hub can be achieved with ceramic materials.

During 1982, development of electronically commutated permanent magnet propulsion motors for electric vehicles was completed. These motors are half the weight of conventional DC motors and have demonstrated a combined motor and controller efficiency of 90 percent.

A hybrid test vehicle, powered by a combination of an electric motor and a small spark-ignition engine was tested in 1982, as the basis for evaluating the potential of possible future hybrid vehicles for achieving high fuel economy with ranges comparable to a conventional car.

Wind Energy Technology

Three MOD-2 wind turbines became operational at Goodnoe Hills, Wash. These machines have a 91-m (300-ft.) blade and each produces 2,500 kilowatts. Experiments are planned to study wind turbine interactions when they operate in groups.

The world's most powerful wind turbine, the WTS-4, began operation during 1982 near Medicine Bow, Wyo.

The Department of the Interior (DOI) turbine produces 4,000 kw with its 78-m (255-ft.)-diameter blade. DOI also sponsored construction of another 2,500-kw MOD-2 wind turbine at the same site. Data from these wind turbines will be evaluated and used with other data to determine whether a "wind farm" of up to 40 machines will be erected near Medicine Bow.

The third generation of 7,000 kw MOD-5 machine is now in the final design phases, with the goal to provide technology for wind turbines that, in large-scale production, could become economical producers of electricity at many locations in the United States.

Terrestrial Photovoltaic Array Technology

Research directed toward cost-competitive, long-life photovoltaic arrays continued with progress in silicon refinement processes, silicon sheet growth techniques and advanced module/array designs. Continuing transfer of technology advances to industry will permit the establishment of low cost manufacturing processes. Economic analyses indicate that price goals of 70 cents per peak watt (1980 dollars) will be technically feasible by the late 1980s provided that the required investments in new equipment are made by private industry.

Solar Thermal Energy Conversion

In 1982, the experimental parabolic dish/Stirling engine system demonstrated a sunlight-to-electricity conversion efficiency of 29 percent -- a milestone for solar conversion systems.

International Application of Solar Energy

NASA supported the Department of Energy, the Agency for International Development, and the Centers for Disease Control by providing solar cell power systems in developing nations for a variety of programs including health services, educational needs, village lighting, pumping water and grinding grain.

SPACE TRACKING AND DATA ACQUISITION

"Keep on tracking" might well be the motto of NASA's Office of Space and Data Acquisition. For keep on tracking it did during 1982, managing two globe-girdling tracking networks -- the Spaceflight Tracking and Data Network (STDN) operated by the Goddard Space Flight Center, Greenbelt, Md., and the Deep Space Network (DSN) operated by the Jet Propulsion Laboratory, Pasadena, Calif. -- and a vast communications system called NASCOM which links them together with NASA mission control centers.

In addition, it continued to oversee preparations for the inauguration of the revolutionary Tracking and Data Relay Satellite System (TDRSS), an in-orbit tracking network of two satellites and a back-up spare, which will support the Space Shuttle and low earth orbiting satellites with a single ground terminal at White Sands, N.M. As the year ended, preparations were underway for launch of the first satellite in the TDRSS series early in 1983 on the first flight of the Space Shuttle Challenger.

During 1982 the networks supported an average of more than 20 different satellite and space probe missions daily, ranging from the highly successful Voyager planetary spacecraft to the Landsat earth resources observations.

Other highlights for 1982 included:

* Up-grading the Space Shuttle ground station at Dakar, Senegal, to provide telemetry and command capability during the early critical phases of Shuttle missions;

* Modification of the TDRSS contract with the Space Communications Co. (SPACECOM), Gaithersburg, Md., giving NASA full operational use of the TDRSS by eliminating the commercial Advanced Westar portion of the program;

* Continuation of work on a new control center at Goddard which will support the Space Telescope, planned for launch in 1985;

* Finally, planning for the closing or consolidation of STDN ground stations continued in anticipation of the advent of the operational TDRSS. Stations at Guam, Hawaii, Ascension Island and Santiago, Chile, will be closed, as will the special Space Shuttle stations at Dakar; Gaborone, Botswana; and Yarragadee, Australia. Space Tracking and Data Network stations co-located with Deep Space Network stations in California, Spain and Australia will be consolidated into the Deep Space Network and continue to support highly elliptical and geosynchronous orbiting satellites which the TDRSS cannot support.

INTERNATIONAL

Vice President George Bush unveiled the flight version of Spacelab, the Space Shuttle's reusable scientific research facility, at Kennedy Space Center, Fla., on Feb. 5.

Spacelab, developed and built under the aegis of the European Space Agency (ESA), is Europe's contribution to the NASA Space Transportation System. It arrived in the United States in December 1981.

Spacelab consists of a cylindrical module in which both astronauts and civilian scientists (called payload specialists) will work, and a series of unpressurized pallets which will support experiments requiring direct exposure to space. Carried in the cargo bay of the Shuttle orbiter, Spacelab will serve as a center for conducting scientific investigations not possible on Earth.

In 1982 Germany became the first country to purchase launch services for a dedicated Spacelab mission (scheduled for launch on the Shuttle in 1985) from NASA, at a cost of approximately $65 million.

The German D-1 mission will consist of low gravity experiments in the field of materials processing in space and life sciences. The experiments are primarily from industry, universities and other research institutions in Germany.

During a visit to Sao Paulo on Dec. 2, President Reagan invited a Brazilian payload specialist to fly aboard the Space Shuttle. The President's remarks were based on the revision in NASA policy announced Oct. 22, expanding opportunities for sponsors of payloads on the Space Shuttle to nominate payload specialists to fly with them. Training and flight of these outside payload specialists normally will be on a reimbursable basis, although in the case of cooperative missions other arrangements may be made.

At a ceremony in November, NASA formally accepted the Remote Manipulator System, a robotic arm, from Canada's National Research Council as ready for operational use aboard future Shuttle flights. The system was designed and built by a Canadian industrial team under a prime contract from the National Research Council of Canada to SPAR Aerospace Ltd.

The manipulator system is a major subsystem of the Shuttle's payload deployment and retrieval system and is used for deploying payloads from the orbiter cargo bay, retrieving them from orbit and returning them to the cargo bay.

The United States, Canada, France and the Soviet Union completed definition and development activities in the cooperative COSPAS/SARSAT project during 1982. The goal of this humanitarian project is to demonstrate the effectiveness of satellites in reducing the time it takes to locate and rescue air and maritime distress victims and significantly increase the possibility of saving lives.

On June 30, 1982, the Soviet Union launched Cosmos 1383, the first COSPAS satellite within the framework of the multilateral project. The first SARSAT equipped satellite developed by the United States, Canada and France will be launched in February 1983. The demonstration and evaluation phase will begin January 1983.

A number of lives have already been saved in Canada, off the coast of New England, West Virginia and in the Caribbean Sea using the COSPAS/SARSAT system which enabled rescue crews to reach the sites in record time.

A Memorandum of Understanding was signed Aug. 8 in Vienna, Austria, by NASA Administrator James M. Beggs and the State Secretary of the German Federal Ministry for Research and Technology, establishing cooperation on an astrophysics mission designated Roentgensatellit (ROSAT). ROSAT, which will conduct both a survey and pointed observations of X-ray sources is scheduled to be launched by the Space Shuttle in 1987.

Beggs headed the U.S. delegation to the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE '82), held in Vienna in August. Delegates from approximately 120 countries and international organizations took part.

The primary purpose of UNISPACE '82 was to promote greater international awareness of the practical benefits of the applications of space science and technology. The conference also explored ways in which countries, particularly the developing countries, can increase their involvement in outer space activities and learn how to apply space technology to solving problems on earth.

Landsat 4 was successfully launched on July 16 from Vandenberg Air Force Base, Calif. Its multispectral scanner operations provide continuity for a worldwide body of (civilian) remote sensing data users.

There are 11 foreign ground stations in operation outside the United States that receive Landsat data through agreement with NASA. Prince Albert, Saskatchewan, Canada; Cuiaba, Brazil; Fucino, Italy; Kiruna, Sweden; Hayotama, Japan; Hyderabad, India; Alice Springs, Australia; Mar Chiquita, Argentina; Harkbeesthoek, South Africa; Bangkok, Thailand; and Pekayon, Indonesia.

On a reimbursable basis, NASA successfully launched the first generation Indian National Satellite System (INSAT-1) spacecraft on a Delta 3910/AM from the Eastern Space and Missile Center, Cape Canaveral Air Force Station, Fla., on April 10.

The second Indian multi-purpose telecommunications-meteorology satellite will be launched on the Space Shuttle mission in July 1983.

NASA also successfully launched two communications satellites (Anik C and D), for Telesat Canada in 1982. Anik D was launched on a Delta on Aug. 26 and Anik C was launched by the Space Shuttle on its fifth mission on Nov. 13.

On March 4 NASA launched Intelsat V-D and on Sept. 28, Intelsat V-E on Atlas Centaurs from the Eastern Space and Missile Center as part of an agreement that was signed with Intelsat in 1980 for the launch of six Intelsat V spacecraft.

During 1982, NASA signed separate Launch Services Agreements with Canada, Mexico, Colombia and the Arab Satellite Communications Organization for the launch of communications satellites. NASA was also notified by Australia that it intends to use the Space Shuttle to launch two communications satellites in July and October 1985, and letters of intent were exchanged on launch services and upper stage procurement. Australia accepted a NASA offer to fly an Australian payload specialist on one of these flights.

NASA and the Saudi Arabian National Center for Science and Technology (SANCST) have agreed during a meeting in Washington, D.C., in early October, that they intend to cooperate in the areas of space and space-related science and technology.

Final preparations are being completed for the launch in January 1983 of the Infrared Astronomical Satellite (IRAS), which is to carry out an all-sky survey of discrete infrared sources. This is a cooperative project involving the United States, the Netherlands and the United Kingdom. The United States is producing the cryogenically-cooled infrared telescope system; the Netherlands is furnishing the satellite; and a mission control center has been established in the United Kingdom.

Development continued during 1982 on Galileo, a cooperative project with the Federal Republic of Germany which will continue the exploration of Jupiter and its environment. The Federal Republic of Germany is contributing a retro propulsion module to mission hardware. Launch of the Galileo orbiter and atmospheric probe is now planned for 1986.

Development also continued on the Space Telescope, a cooperative project with the European Space Agency, which is scheduled for launch on the Space Shuttle in 1985.

NASA and the National Research Council of Italy (CNR) continued their closely coordinated design studies for possible coordinated development of a Tethered Satellite System (TSS) for operation from the Shuttle.

In November NASA and Japan conducted a senior-level review of ongoing joint studies and projects in a variety of space science and applications areas.

During 1982, milestones were reached in NASA's global, geodynamics program. Geodynamics is the study of the solid earth including movement and deformation of crustal gravity, magnetic fields and rotational dynamics. A significant aspect of this program is the international coordination of measurement campaigns to study earth dynamics.

Agreements were reached in 1982 with Australia, Canada, Chile, France, Germany, Italy, Japan, Mexico, the Netherlands, Sweden and Switzerland to participate in NASA's earthquake research program.

At the invitation of the Chinese Society of Astronautics, astronauts Jack Lousma and Gordon Fullerton visited Beijing, Xian, Shanghai and Hangzhou in the People's Republic of China, Dec. 2-16. Their schedule included meetings with officials of the Chinese Academy of Space Technology and the Society of Astronautics, as well as visits to scientific facilities and sightseeing.

1982 NASA LAUNCH RECORD

DATE	PAYLOAD	VEHICLE	SITE*	REMARKS
Jan. 15	RCA-C	Delta	ESMC	Commercial communications
Feb. 25	Westar IV	Delta	ESMC	Commercial communications
March 4	Intelsat V-D	Atlas Centaur	ESMC	International communications
March 22	STS-3 Columbia	Space Shuttle	KSC	Third Space Shuttle mission
April 10	INSAT 1A	Delta	ESMC	India communications
June 8	Westar V	Delta	ESMC	Commercial communications
June 27	STS-4 Columbia	Space Shuttle	KSC	Fourth Space Shuttle mission; final developmen[t] flight
July 16	Landsat-D	Delta	WSMC	NASA earth resources applications
Aug. 26	Telesat-G	Delta	ESMC	Canadian communications
Sept. 28	Intelsat V-E	Atlas Centaur	ESMC	International communications
Oct. 27	RCA-E	Delta	ESMC	Commercial communications
Nov. 11	STS-5 Columbia	Space Shuttle	KSC	Fifth Space Shuttle mission; first operationa[l] flight
Nov. 11	SBS-C	PAM-D	STS-5	Commercial communications
Nov. 12	ANIK-C	PAM-D	STS-5	Canadian communications

* Launch Sites
KSC - Kennedy Space Center, Fla.
ESMC - Eastern Space and Missile Center, Cape Canaveral, Fla.
WSMC - Western Space and Missile Center, Vandenberg Air Force Base, Calif.
STS-5 - Space Shuttle orbiter Columbia

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